

Attorney's Docket: 1999CH017
Serial No.: 10/070,622
Art Unit 1731
Response to the Office Action of Feb. 4, 2003

REMARKS/ARGUMENTS

The Office Action mailed February 4, 2003 has been carefully considered together with each of the references cited therein. The amendments and remarks presented herein are believed to be fully responsive to the Office Action. Accordingly, reconsideration of the present Application in view of the following remarks is respectfully requested.

Applicant has amended the Application to attend to housekeeping matters and to more clearly describe the invention. The reference to U.S. Patent No. 2,725,306 is now properly indicated in the paragraph beginning at the top of page 2. This change was necessary to correct an obvious typographical error which was not earlier noticed. In view of this amendment, the objection to the disclosure should be withdrawn. A new Information Disclosure Statement properly listing U.S. Patent No. 2,725,306 is provided with this response and accompanied by the appropriate fee. It is not believed that any new matter was introduced by this amendment, and that no additional search is required by the office.

Claims 7 and 8 have been withdrawn as a result of an earlier restriction requirement. Applicant retains the right to present claims 7 and 8 in a divisional application.

Claim 10 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention in claim 10 for the use of the term "...simultaneously intaglio and offset printer paper or board". Claim 10 was amended to now recite -intaglio and offset printer paper or board- -, which should now be clear. Therefore the rejection of claim 10 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention should be removed in view of the above amendment.

New claims 17-22 were added to protect the invention. Support for independent claim 17 may be found in Applicant's Specification on page 4, lines 19-31, page 12, and originally filed claim 1. Support for claims 18 and 19 may be found in Applicant's Specification on page 9, lines 7-9 and 22-24, respectively. Support for independent claim 20 and dependent claims 21 and 22 may be found in Applicant's Specification at page 14, lines 8-27, and originally filed claim 1. It is believed that no new matter has been added and that no additional search is required on the part of the office. It is not believed that an additional fee for the new claims is required, however if any such fee is necessary, the Office is hereby authorized to charge any fee deficiency to Applicant's Deposit Account No. 03-2060.

Applicant's invention relates to a process for the surface-finishing of a paper or board with an aqueous solution consisting of a polyethylene glycol having an

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average molecular weight greater than or equal to 1500 or the polyethylene glycol and at least one additional additive which is a finishing additive or a formulation additive. Applicant's aqueous solution is applied to the surface of a hydrophilic paper or board sheet in a manner by which the hydrophilic paper or board sheet is not soaked, but is dried in a manner which increases the concentration of the polyethylene at the surface. The aqueous solution of the instant invention can be applied to the surface of the hydrophilic paper or board sheet as it is produced from a paper making machine at the dry end before the smoothing press, and/or with remoistening before a calendering step in the production of calendered paper or board. By the term aqueous solution, it is meant that the solution is a true solution or a colloidal solution and if any insoluble components are present, their proportion is so small that the aqueous remains an essentially clear solution.

Claims 1-6 and 10-16 stand rejected under 35 USC § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Rohringer et al., US. Patent No. 5,622,749('749). This rejection is respectfully traversed. Rohringer et al. describes a method for the fluorescent whitening of paper by application of the defined optical brightener in paper coatings or in the size press, as mentioned at column 1, lines 29-31, and as described in more detail for the coatings from column 1, line 37, to column 7, line 7, and in particular in column 1 in lines 52-58, and for application in the size press, at column 7, in lines 8-22. The process of the present invention is neither a coating nor a sizing in a size press, but is a surface-finishing by application of the defined aqueous solution (L_w) followed by the defined pressure treatment in the smoothing rolls and drying.

The coating, in particular as described in Rohringer et al., and especially as exemplified, is a treatment with a coating composition which is an aqueous **slurry or dispersion** containing undissolved matter, in particular the white pigments, and furthermore a substantial proportion of a binder. Such a coating composition is not a solution. The compositions (L_w) in the process of the invention are not slurries or dispersions, but are aqueous solutions as defined.

Sizing is a treatment with a chemical additive that provides paper and paperboard with resistance to wetting and penetration, usually by aqueous liquids, as defined e.g. in Kenneth W. Britt "HANDBOOK OF PULP AND PAPER TECHNOLOGY" 2nd edition, van Nostrand Reinhold Company, page 335, lines 6-13 (copy enclosed) and is a treatment that produces water repellency. Further, sizing in a size press is a treatment by which the substrate is impregnated or soaked with the sizing liquor and then expressed through squeezing rolls to the desired uptake. The squeezing rolls serve to express excess liquor and are not smoothing rolls. The treatment described in Rohringer et al, is not a surface finishing according to the invention, which is a superficial treatment with the aqueous solution (L_w).

Example 8 of Rohringer et al. relates to a process in which a paper is impregnated in the size press with a composition as defined at page 12 in lines 23-

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25, which is an aqueous sizing composition containing a minor proportion of the solution of Example 8(A) and a major proportion of anionic starch. The solution of Example 8(A) of Rohringer et al. is an organic solution of 10 parts of the defined optical brightener dissolved in a mixture of 12.5 parts of PEG 1500 and 25 parts of propylene glycol and that contains also 1.6 parts of nitrilotriacetic acid (NTA): this solution is not an aqueous solution but is an organic solution. The treatment described in Example 8(B) of Rohringer et al. is a sizing with anionic starch with an aqueous solution containing 8% of the anionic starch and a quantity of the solution of Example 8(A) corresponding to 6 g/l of the optical brightener, i.e. 0.6% of the optical brightener accompanied by 0.75% of PEG 1500, 1.5% of propylene glycol and 0.096% of NTA and the substrate is impregnated with this composition to an uptake of 35%. This application is a sizing with an anionic starch, i.e. with a starch that has been modified in order to lower its gelling temperature, so as to provide a water repellency and the presence of the PEG and propylene glycol mixture serves only as a solvent for the optical brightener. As mentioned above, sizing is a treatment that produces water repellency.

In Item 6 the Examiner further refers to the mention of photographic paper and adds that photographic paper is always smoothed/calendered. This statement refers to coated material and is distinguished from the process of the invention for the reasons mentioned above. Furthermore the Examiner's statement that photographic paper "are always smoothed/calendered" would be mentioned in the further cited references has not been complemented by any mention of a particular text portion of any of the references. Because the further cited references are not particularly or only concerned with the production of photographic paper but related to more generic processes, the Examiner is requested to indicate the particular pieces of literature and text or portions of the further references to which the Examiner is referring in his observation. Thus, the coating process of Rohringer et al. is different from the instant invention as claimed, and Rohringer et al does not contain a process for the surface finishing of paper, nor are any of the coating compositions the same as applicant's aqueous solutions. Furthermore Rohringer et al. does not provide any suggestion or motivation for any surface finishing of paper or board with an aqueous solution as disclosed in the present application. None of the additionally cited references mentioned for their smoothing or calendering steps can overcome the differences between the coating composition of Rohringer et al. and applicant's aqueous solution. Therefore, the rejection of claim 1 under §102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Rohringer et al. (US Patent 5,622,749) should be withdrawn for the reason that unless all of the same elements are found in exactly the same situation and united in the same way to perform the identical function in a single prior art reference there is no anticipation and for the reason that no one skilled in the art armed with the disclosure of Rohringer et al. which clearly is directed to a different process with a different composition would be able to produce applicant's invention for a surface finishing process to produce high quality paper or board, even in view of the

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additional references provided by the examiner to show photographic paper is typically smoothed and calendered. The rejection of claims 2-6 and 9-16 under 35 USC § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Rohringer et al., US. Patent No. 5,622,749('749) should be withdrawn for the reasons given in support of claim 1.

Claims 1 and 9 stand rejected under 35 USC § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Ploetz et al., US Patent No. 3,779,791 ('791). This rejection is respectfully traversed. In this Item the examiner relies on US patent No. 3,779,791 (Ploetz et al.), with reference to col. 2, lines 39-43, which is a portion of the Example of Ploetz et al. Ploetz et al. describe in the cited example the impregnation of a paper "after calendering" (col. 2, line 33) with the defined solution of a mixture of two polyethylene glycols and the completely impregnated, or saturated material is "freed of excess solution by being guided between two rolls" (col. 2, lines 40-41), i.e. the substrate saturated with the composition is fed between the rolls and leaves the rolls with an up-take of 36.7% of the liquid. These rolls are just rolls for liquor up-take adjustment and not smoothing rolls. There is no teaching or suggestion that the previously calendered rolls would require any further smoothing following the impregnation step. In the present invention, smoothing rolls are not rolls for liquor up-take adjustment, but rather have an influence on densification and caliper and on the surface of the paper or board, as mentioned in the specification at page 12, in lines 13-17. The Examiner's assumption that because in Ploetz et al. the impregnated paper is passed between two rollers there is provided smoothing, is unsupported. The paper has already been calendered before impregnation and the impregnation of the paper leaves the rolls with a substantial liquid content throughout the paper. Furthermore, the drying step of Ploetz et al. takes place after contact with the two rollers, which is a further indication that no smoothing of the saturated sheet is taking place between the two rollers. Also here the treatment is not a surface finishing and the impregnated paper is also not subjected to a pressure treatment through smoothing rolls. As stated above, in the process of the instant invention the defined paper or board is surface-finished as defined with the defined solution (L_w) by the defined process, which comprises subjecting the surface-treated substrate to the pressure of smoothing rolls. This way of proceeding is neither described nor suggested in Ploetz et al. On the contrary, Ploetz et al. describes a process for countering the problem of paper becoming brittle and losing mechanical strength when subjected to sterilizing temperatures of 200°C and above, and thus aim at a paper with regular strength throughout the cross-section, and for this reason they impregnate the paper after calendering, and do not apply the composition just on the surface. Thus, the content of Ploetz et al. is different from the invention claimed in the present patent application, and also does not contain any suggestion or hint for any surface finishing of the kind claimed in the present patent application. Therefore, the rejection of claims 1 and 9 under §102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over Ploetz et al. (US Patent 3,779,791)

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should be withdrawn for the reason that unless all of the same elements are found in exactly the same situation and united in the same way to perform the identical function in a single prior art reference there is no anticipation, and for the reason that no one skilled in the art armed with the disclosure of Ploetz et al. which clearly is directed to a paper impregnation and drying process to improve temperature resistance, and is without any teaching or suggestion for a smoothing step would be able to produce applicant's invention for a surface finishing process to produce high quality paper or board.

It is respectfully submitted that, in view of the above remarks, the objection to the Specification, the rejections under 35 U.S.C. 112, 102(b) and 103(a) should be withdrawn and that this application is in a condition for an allowance of all pending claims. Accordingly, favorable reconsideration and an allowance of all pending claims are courteously solicited.

An early and favorable action is courteously solicited.

Respectfully submitted,



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Attachment:

Kenneth W. Britt "HANDBOOK OF PULP AND PAPER TECHNOLOGY" 2nd edition, van Nostrand Reinhold Company, page 335, lines 6-13

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Handbook of
**PULP AND PAPER
TECHNOLOGY**

SECOND EDITION
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5-4 Sizing of Paper

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Introduction The term "sizing" has sometimes been applied so broadly to paper mill processes as to indicate the addition of almost any chemical agent designed to modify the properties of the paper product. In modern usage, however, the meaning of this word is much more precise and limiting. Sizing is now defined as the process in which a chemical additive provides paper and paperboard with resistance to wetting and penetration, usually by aqueous liquids. Thus, sizing produces water repellency. This definition excludes the addition of materials (a.g., surface coatings of hydrophilic polymers) that are designed to produce other effects.

Cellulose is a very hydrophilic (water-loving) substance, and pulp fiber surfaces have a high specific energy. Thus, water readily wets these surfaces. The very porous structure of paper makes it act like a sponge in the presence of liquids. In particular, unsized (waterleaf) paper soaks up or "wicks" aqueous liquids very rapidly and extensively. Various sizing agents have been developed to make paper reasonably water repellent. These additives provide paper with considerable resistance to wetting and penetration by liquids such as ink, water, and milk, thus leading to a product that can be used as writing paper, a water-resistant wrapping, or a milk carton.

When an aqueous liquid is placed on the surface of paper, it must first wet the fibers, after which it is drawn into the sheet structure by the capillary action of the pores or spaces between adjacent fibers. In addition, the liquid tends to spread out on the surface of the paper in a process called "feathering." Liquid can also penetrate into the paper and along its surface by paths through the cellulose material itself. It is generally believed that liquid flows initially through the pores between fibers (transudation) and eventually penetrates through the cellulose material,^{1,2} although results obtained from certain sizing tests suggest the reverse of this sequence of events.³ The rate of flow of a liquid through a very thin tube or capillary is generally represented by the Washburn equation⁴ which combines the equation representing fluid rise in a capillary tube with the Poiseuille equation for laminar flow through a tube:

$$dl/dt = (Pr^2 + 2\gamma \cos \theta) / 8\eta l$$

Where l is the length of capillary filled with liquid; r is the capillary radius; P is the external pressure; γ is the surface tension of the liquid; θ is the contact angle between the liquid and the capillary wall; and η is the viscosity of the liquid. In the absence of any appreciable external pressure, the contact angle determines the driving force for liquid penetration into the paper structure. A high contact angle re-